Message from the President

Dear Friends:

2016 was a challenging year for everyone, and The Glaucoma Foundation was certainly not immune to the meaningful economic uncertainties we were all presented. However, as the year ended, we were able to cite meaningful and measurable accomplishments in all key areas.

Our mission continues to embrace the funding of cutting-edge research that is being performed around the world by the best and the most talented investigators. They each offer a vision coupled with an idea, that if validated and achieved, may stand to make a meaningful difference in the diseases that we call glaucoma.

The second component of our core purpose is to provide educational outreach to all, relative to proper eye care and awareness about glaucoma. As we all understand, proper and timely diagnosis is essential to arresting the progress of this disease. We are continually reminded that our efforts have made a huge impact on behalf of the populations of the world.

During the year 2016, we hosted an award-worthy 23rd Annual International Think Tank in New York City. Forty eight participants from around the world gathered to address: “EXFOLIATION SYNDROME: MOVING FORWARD.”

Enormous positive progress was demonstrated throughout the session, with the hope being that the same exciting report will be forthcoming from the 24th Annual Think Tank that will be held in June, 2017 once more in New York City.

We are very proud of our Foundation and its accomplishments. We are also extremely excited about the future service that will be provided to all of our constituencies. We thank you for your support of and interest in The Glaucoma Foundation. You and we, as partners, can make a significant difference to the world in which we operate.

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Director, Molecular Ophthalmic Genetic Laboratory
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University of Connecticut Health Center

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Germany

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New York University School of Medicine

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University of Kansas Medical Center

Michael Joseph Young, PhD
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Associate Professor
Department of Ophthalmology, Harvard Medical School

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Vice President, Glaucoma Development, R&D
Alcon Research, Ltd.
2016 RESEARCH GRANTS

R. Rand Allingham, MD
Duke Eye Center, Durham, North Carolina

Functional Analysis of Rare Protective Coding Variants in LOXL1

Exfoliation glaucoma (XFS) is the most common cause of identifiable open-angle glaucoma worldwide. This form of glaucoma is caused, at least in part, by genetic variants in an enzyme called lysyloxidase-like 1 (LOXL1). This grant project will study how some rare variants of LOXL1 that have been found to be highly protective for exfoliation glaucoma in the Japanese population affect LOXL1 protein function.

Hani Levkovitch-Verbin, MD, MPA
Medical Research Sheba Medical Center, Goldschleger Eye Institute, Tel-Hashomer, Israel

Exfoliation Syndrome: Epidemiology and Association with Systemic Diseases and Ocular Disorders in the Maccabi Glaucoma Study

Exfoliation syndrome (XFS) accounts for 20 to 25 percent of open-angle glaucoma worldwide and the majority of glaucoma in some countries. This study will assess the demographics and clinical characteristics of this syndrome in a large Israeli population and evaluate its association with various systemic factors and diseases as well as solar exposure-related diseases in these patients. For this purpose, the study will use Maccabi Health Services electronic medical database (14,267 patients with XFS and XFG). This study will contribute to an understanding of this disease and its risk factors and may lead to new recommendations for prevention.

Yutao Liu, MD, PhD
Georgia Regents University, Augusta, Georgia

LOXL1 Containing Exosomes in Exfoliation Syndrome and Glaucoma

In addition to being the most common recognizable cause of open-angle glaucoma worldwide, XFS patients also have high rates of cataract and cataract surgery complications. Both genetic and environmental factors have been shown to contribute to the development of XFS and associated glaucoma. This project will study the impact of XFS-related environmental factors on the secretion of nanoparticles containing LOXL1 and other known proteins associated with XFS development. We will study these small particles secreted from XFS affected tissues in multiple different aspects. Successful completion of this project will provide critical understanding on how these environmental factors contribute to the risk of XSF by affecting the secretion of LOXL1 and other related proteins. More importantly, the novel discoveries through this proposal may lead to future therapies and preventions for this common and severe eye disease.
Ursula Schlotzer-Schrehardt, PhD
University of Erlangen-Nurnberg, Germany

**LOXL1-Associated Pathomechanisms Predisposing to Optic Nerve Damage in Pseudoexfoliation Glaucoma**

This project aims to uncover pathomechanisms associated with dysregulation of LOXL1 that result in the development of exfoliation glaucoma. It tests the working hypothesis that XFS-associated risk variants of the LOXL1 gene are causally related to elastic fiber abnormalities in the lamina cribrosa and are influenced by pathophysiologic factors, such as mechanical stress and strain. This would further suggest that compounds stimulating expression of LOXL1 have a potential to reverse the adverse effects of disease and stress on elastic tissue function.

Deborah Wallace, PhD
University College, Dublin, Ireland

**To Investigate the Role of Methylation in the Regulation of Lysyl Oxidase Like 1 Expression in Pseudoexfoliation Glaucoma**

Genetic studies have identified a gene called lysyl oxidase like 1 (LOXL1) which is thought to be important for an individual's predisposition to developing pseudoexfoliation syndrome. Other studies have shown that levels of LOXL1 can vary between normal and disease patients and also in disease progression. While LOXL1 is of importance other factors also play a role in determining if an individual develops glaucoma, for example levels of oxidative stress and hypoxia (lack of oxygen) in the eye. In this study we wish to address the question of how levels of LOXL1 are altered as glaucoma develops and progresses. We will examine a mechanism of controlling LOXL1 expression called epigenetics. This method of regulation the expression of a gene can be induced in cells exposed to hypoxic environment in glaucoma. We will investigate levels of LOXL1 in cells from donors with and without glaucoma, and in cells from normal donors subjected to hypoxia and investigate the role of epigenetics in controlling LOXL1 express.


Barbara Wirostko, MD
John A Moran Eye Center, University of Utah, Salt Lake City, Utah

*Morbidity and Mortality in Patients with Exfoliation Syndrome: A Large Database Analysis - Utah Project on Exfoliation Syndrome (UPEXS)*

This project will utilize a large Utah Population Data Base (UPDB) containing over 8 million lives to determine the impact exfoliation syndrome (XFS) has on lifestyle and death. A number of studies have reported the increased risk of systemic disorders in patients with XFS. Using the Utah dataset, it was just reported that XFS is associated with an increased risk of pelvic organ prolapse, a major common disorder in women. To date there has been no report of increased mortality in people with XFS in specific populations. Expanded utilization of this powerful resource will facilitate the ability to study how XFS increases or potentially reduces risk of major disease.

Yong Yuan, PhD
College of Medicine, University of Cincinnati, Ohio

*Development and Characterization of Mouse Model for Exfoliation Syndrome*

Currently, no mouse model is available that can recapitulate the symptoms of this disease. We developed mouse models for primary open-angle glaucoma, which unexpectedly, also had the hallmarks of exfoliation syndrome. This suggests that our mouse models potentially have the two most important aspects of the disease: exfoliation syndrome and glaucoma. The objective of this proposal is to develop mouse model for exfoliation syndrome. This new mouse model will lead to a better understanding of the disease which will ultimately lead to new strategies combating the disease.
## THE GLAUCOMA FOUNDATION, INC.
### FINANCIAL SUMMARY
### AT DECEMBER 31, 2016

**Assets**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and cash equivalents</td>
<td>$1,190,737</td>
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<tr>
<td>Pledges receivable</td>
<td>571,930</td>
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<tr>
<td>Prepaid expenses and other assets</td>
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</tr>
<tr>
<td>Security deposit</td>
<td>27,796</td>
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<tr>
<td>Property and equipment, net</td>
<td>3,333</td>
</tr>
<tr>
<td>Investments held for endowments</td>
<td>5,283,643</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td><strong>$7,082,073</strong></td>
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</tbody>
</table>

**Liabilities and Net Assets**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts payable and accrued expenses</td>
<td>$58,230</td>
</tr>
<tr>
<td>Grants payable</td>
<td>117,500</td>
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<tr>
<td>Deferred rent</td>
<td>9,482</td>
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<tr>
<td><strong>Total liabilities</strong></td>
<td><strong>185,212</strong></td>
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<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrestricted</td>
<td>2,190,753</td>
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<tr>
<td>Board designated</td>
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<tr>
<td><strong>Total unrestricted net assets</strong></td>
<td><strong>2,521,405</strong></td>
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<tr>
<td>Temporarily restricted</td>
<td>2,875,419</td>
</tr>
<tr>
<td>Permanently restricted</td>
<td>1,500,037</td>
</tr>
<tr>
<td><strong>Total net assets</strong></td>
<td><strong>6,896,861</strong></td>
</tr>
<tr>
<td><strong>Total liabilities and net assets</strong></td>
<td><strong>$7,082,073</strong></td>
</tr>
</tbody>
</table>
The Glaucoma Foundation, Inc.

Statement of Activities
For the Year Ended December 31, 2016

<table>
<thead>
<tr>
<th></th>
<th>Unrestricted</th>
<th>Temporarily Restricted</th>
<th>Permanently Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Support and revenue:</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Contributions</td>
<td>$1,212,542</td>
<td>$500,000</td>
<td>$50</td>
<td>$1,712,592</td>
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<td>Special event income</td>
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<tr>
<td>(net of expenses with</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a direct benefit to</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>donor)</td>
<td>133,880</td>
<td></td>
<td>133,880</td>
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<tr>
<td>Interest income</td>
<td>1,303</td>
<td></td>
<td></td>
<td>1,303</td>
</tr>
<tr>
<td>**Total support and</td>
<td>1,347,725</td>
<td>500,000</td>
<td>50</td>
<td>1,847,775</td>
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<tr>
<td>revenue**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Expenses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program services</td>
<td>1,104,452</td>
<td></td>
<td></td>
<td>1,104,452</td>
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<tr>
<td>Supporting services:</td>
<td></td>
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<td></td>
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<tr>
<td>Management and general</td>
<td>106,019</td>
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<td>106,019</td>
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<tr>
<td>Fundraising</td>
<td>167,172</td>
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<td>167,172</td>
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<tr>
<td>**Total supporting</td>
<td>273,191</td>
<td></td>
<td>0</td>
<td>273,191</td>
</tr>
<tr>
<td>services**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total expenses</strong></td>
<td>1,377,643</td>
<td></td>
<td>0</td>
<td>1,377,643</td>
</tr>
<tr>
<td><strong>Change in net assets</strong></td>
<td>(29,918)</td>
<td>500,000</td>
<td>50</td>
<td>470,132</td>
</tr>
<tr>
<td>from operating activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td>160,018</td>
<td>438,140</td>
<td></td>
<td>598,158</td>
</tr>
<tr>
<td>**Total non-operating</td>
<td>160,018</td>
<td>438,140</td>
<td>0</td>
<td>598,158</td>
</tr>
<tr>
<td>activities**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Change in net assets</strong></td>
<td>130,100</td>
<td>938,140</td>
<td>50</td>
<td>1,068,290</td>
</tr>
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<td><strong>Net assets - beginning</strong></td>
<td>1,143,135</td>
<td>0</td>
<td>4,685,436</td>
<td>5,828,571</td>
</tr>
<tr>
<td>as originally stated</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Reclassification</strong></td>
<td>1,248,170</td>
<td>1,937,279</td>
<td>(3,185,449)</td>
<td>0</td>
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<tr>
<td><strong>Net assets - beginning</strong></td>
<td>2,391,305</td>
<td>1,937,279</td>
<td>1,499,987</td>
<td>5,828,571</td>
</tr>
<tr>
<td><strong>Net assets - ending</strong></td>
<td>$2,521,405</td>
<td>$2,875,419</td>
<td>$1,500,037</td>
<td>$6,896,861</td>
</tr>
</tbody>
</table>

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